

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: **TAUBER et. al**

Parent Application Serial No.: **09/845,108**

Parent Application Filed: **April 26, 2001**

Attorney Docket No.: **CECOM 5521**

For: **RARE EARTH METAL COMPOUNDS FOR USE IN HIGH CRITICAL
TEMPERATURE THIN FILM SUPER-CONDUCTORS**

Sir:

In accordance with Revised Amendment Format, these Remarks are submitted to support amending the above-identified application.

REMARKS

Claims 1-79 are now in the case. Claims 1-44 and 48-79 are drawn to non-elected claims and have been withdrawn. Claims 45-47, as amended, are directed to thin film high critical temperature superconductor structures constructed of thin films composed of $\text{Sr}_2\text{LuSbO}_6$ and $\text{Sr}_2\text{LaSbO}_6$. New claim 80 has been added.

This is a divisional application of U.S. Patent Office Application Serial No. 09/845,108, entitled, "Rare Earth Metal Compounds For Use In High Critical Temperature Thin Film Super-Conductors, Ferroelectrics, Pyroelectrics, Piezoelectrics and Hybrids," which was designated as CECOM Docket No. 5469 and filed on April 26, 2001, hereinafter the "parent case." In the parent case (09/845,108), the Examiner issued a restriction requirement and following Applicants' election of claims to Invention Group I and several amendments, the Examiner issued a Notice of Allowance. The parent case (09/845,108) is currently pending before the U.S. Patent Office, and this co-pending divisional application is prosecuting a previously non-elected claim from the parent case.

The parent case (09/845,108) was a continuation in part of U.S. Patent Office Application Serial No. 09/337,724, with the same title, filed on June 21, 1999, and designated as CECOM Docket No. 5433, which was a continuation in part of U.S. Patent Office Application Serial No.

08/717,822 with the same title, filed on September 24, 1996 and designated as CECOM Docket No. 5304. That application (Serial No. 08/717,822) was a continuation in part of U.S. Patent and Trademark Office Application Number 08/333,669 entitled, "Rare Earth Metal Containing Compounds and High Critical Temperature Thin Film Superconductors, Ferroelectrics, Pyroelectrics, Piezoelectrics, And Hybrids Including the Rare Earth Metal Containing Compounds," filed on November 3, 1994 and designated as CECOM Docket No. 5097, the "first application." It is respectfully submitted that the parent case (09/845,108) filed on April 26, 2001 by the inventors herein, is currently pending before the U.S. Patent Office and is therefore "an application similarly entitled to the benefit of the filing date of the first application," as mandated by 35 USC § 120 and 35 USC § 121, which is November 3, 1994. This divisional application's specification, as amended, claims priority from the November 3, 1994 effective filing date of the first application (08/333,669).

As required by the Revised Amendment Format, separate Amendments To The Claims, Amendments To The Specification and these Remarks are enclosed with this Amendment. The Examiner from the parent case (09/845,108) required a restriction to one of five groups of inventions under 35 USC § 121. In response to that restriction requirement, Applicants elected Invention Group I, which were drawn to a rare earth compound. In the parent case (09/845,108), the Examiner issued a Notice of Allowance allowing amended claims 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40 and 43. In this Preliminary Amendment, Applicants seek to prosecute claims 45-47 from Invention Group III, which are drawn to a superconductor, classified by the United States Patent & Trademark Office in Class 505, subclass 100+, comprising thin films having the general formula Sr_2RESbO_6 wherein RE is the rare earth metal Lutetium with the formula Sr_2LuSbO_6 and rare earth metal Lanthanum with the formula Sr_2LaSbO_6 . This Preliminary Amendment revises previously non-elected claims 44-47 in a manner consistent with the parent case's allowed claims, includes a new claim 80 drawn to a thin film high critical temperature superconductor comprising Sr_2LaSbO_6 thin films interspersed with $YBa_2Cu_3O_{7-\delta}$ layers and otherwise puts this divisional application in a condition for allowance.

In the parent case (09/845,108), the Examiner rejected the claims under 35 USC § 103 as being obvious over an article by Fesenko entitled "Synthesis and Study of $A_2Sb_5O_6$ and

A3Sb25+B'O9-type Ternary Oxides with Perovskite Structure," an article by Wittmann et al. entitled "On The Ordering Of B^{III} and M^V In Perovskites of the Type A₂B^{III}M^VO₆" and an article by Blasse entitled "New Compounds With Perovskite-Like Structures." After filing a Request For Continued Examination, claims 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40 and 43
5 were amended from objectionable dependent claims depending upon rejected base claims to independent claims for dielectric substrates. For example, claim 28 from the parent case (09/845,108) recited a dielectric substrate of the general formula Sr₂RESbO₆, further comprising the compound Sr₂LaSbO₆, where the general formula included an Sb⁵⁺ constituent atom with a polarizability of about 1.2 Å³, the dielectric substrate being heated for at least 20 hours at
10 between 1400° C and 1600 ° C and being constructed in a bulk form, having a specific low dielectric constant and low dielectric loss and the dielectric substrate having an ordered perovskite cubic crystalline structure. It is respectfully submitted that reciting the crystalline structure of the parent case's dielectric substrates was a significant difference between them and cited prior art references supporting the allowability of those claims.

15 It is respectfully submitted that independent claims 45 and 47, as amended, now recite an ordered perovskite cubic crystalline structure similar to the parent case's allowed claim 28, and the crystalline structures recited in allowed claims 7, 10, 13, 16, 19, 22, 25, 31, 34, 37, 40 and 43. Claim 45, as amended, now recites a thin film high critical temperature structure, comprising thin films composed of Sr₂LuSbO₆ being interspersed with a copper oxide superconductor layers, the
20 thin films being deposited by pulsed laser deposition and being heated for at least 20 hours at between 750° C to 825° C, the thin films having a low dielectric constant of 15.1 and a low dielectric loss of less than 1 x 10⁻³ without a phase transition, the formula including an Sb⁵⁺ constituent atom with a polarizability of about 1.2 Å³ and the thin films having an ordered perovskite cubic crystalline structure. Claim 47, as amended, is similar to amended claim 45
25 except that the thin films are composed of Sr₂LaSbO₆, the low dielectric constant is 16.3 and the low dielectric loss is 3.8 x 10⁻³ without a phase transition. Amended claim 46 depends from claim 45 and recites the layers being constructed of YBa₂Cu₃O_{7-δ} and new claim 80 depends from amended claim 47 and also recites interspersing with YBa₂Cu₃O_{7-δ} layers. It is respectfully submitted that the ordered perovskite cubic crystalline structure is adequately supported by

several specification passages. For example, specification page 3, lines 13-15, states:

Indexed powder diffractometer data taken using CuK α radiation, reveals these compounds to be ordered perovskites. With the exceptions of Sr₂LuSbO₆ and Sr₂LaSbO₆ that are cubic, all of the other compounds are found to be pseudo-cubic, tetragonal.

(Emphasis Supplied)

Similarly, specification page 5, lines 12-16 further describes crystalline properties:

These compounds are distorted from cubic. They are indexed on the basis of a tetragonal unit cell with two exceptions, Sr₂LuSbO₆ and Sr₂LaSbO₆ that are cubic. See TABLE I. All these compounds form an ordered perovskite structure in which alternate B site ions are occupied by Sb and a rare earth ion. This gives rise to weak reflections in the X-Ray diffraction powder pattern that requires doubling of the unit cell. (Emphasis Supplied)

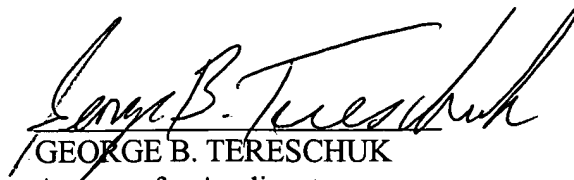
Based on these specification references, it is respectfully submitted that the specification adequately supports the thin film high critical temperature structures composed of Sr₂LuSbO₆ and Sr₂LaSbO₆ thin films having an ordered perovskite cubic crystalline structure, which is neither taught nor suggested by the cited prior art references.

The Amendments To The Specification relate to formal matters such as revising the title, adding a statement claiming priority from the November 3, 1994 effective filing date of the first application, substituting the term "thin film high critical temperature structures" for "dielectric substrate" on specification page 2, lines 12-14 and correcting a few informalities, without adding any prohibited new matter.

For these reasons, it is respectfully submitted that claims 45-47, as amended, have been revised in a manner similar to allowed claims 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40 and 43 of the parent case (09/845,108). Therefore, it is respectfully requested that claim 45-47, as amended, and new claim 80 be allowed and pass to issue.

Should the Examiner require further information, the Examiner is invited to telephone the applicants' attorney at the telephone number listed below.

Respectfully Submitted,


GEORGE B. TERESCHUK

Attorney for Applicants
Registration No. 37,558
Tel.: (732) 532-9795

11 March 2004

DATE